Soup to Nuts: Changing Operating Parameters for HOV Facilities

Sponsored by the HOV Pooled-Fund Study and the Federal Highway Administration

U.S.Department of Transportation
Federal Highway Administration

Overview:

- Defining HOV facilities.
- Managing HOV lanes.
- Vehicle-eligibility requirements.
- Vehicle-occupancy requirements.
- HOV operating hours.

Defining HOV Facilities

High-occupancy vehicle (HOV) facilities are used in metropolitan areas to improve the people-moving capacity, rather than the vehicle-moving capacity, of congested freeway corridors.

HOV facilities provide travel-time savings and more predictable travel times to encourage shared rides over driving alone.

Defining HOV Facilities

Four types of HOV facilities:

- Busway or exclusive HOV facility (separate right-of-way).
- Exclusive HOV facility (freeway right-of-way).
- Concurrent flow HOV lane.
- Contraflow HOV lane.

Defining HOV Facilities

Busway or exclusive HOV facility (separate right-of-way):

A roadway or lane(s) developed in a separate right-of-way and designated for exclusive use by HOVs.

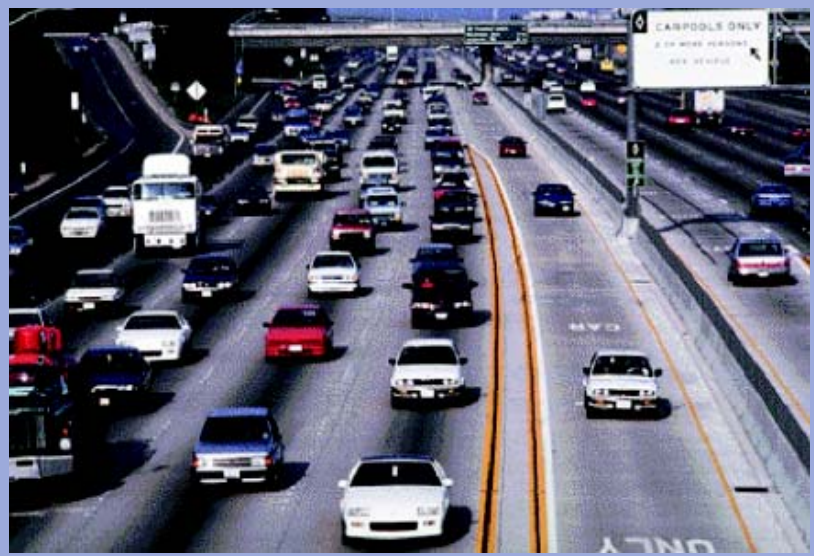
Defining HOV Facilities

Exclusive HOV facility (freeway right-of-way):

One or more lane(s) within the freeway right-of-way, physically separated from the general-purpose freeway lanes and used exclusively by HOVs for all or a portion of the day.

Defining HOV Facilities

Concurrent flow HOV lane :



A freeway lane in the peak direction of travel, not physically separated from the general-purpose freeway traffic lanes, designated for the exclusive use by HOVs for all or a portion of the day.

Defining HOV Facilities

Contraflow HOV lane :

A freeway lane in the off-peak direction of travel, commonly the inside lane, designated for exclusive use by HOVs traveling in the peak direction.

Managing HOV Facilities

Federal funding supports the design, right-of-way acquisition, construction, and operation of freeway HOV lanes.

FHWA provides periodic HOV program guidance to support the Federal investment in freeway HOV facilities.

Managing HOV Facilities—
Agency Involvement

The State DOT is the lead agency involved with managing the operation of HOV lanes and is responsible for:

- Developing the operation and enforcement plan.
- Conducting performance monitoring.
- Assessing potential changes in operations.

Managing HOV Facilities—
Agency Involvement

Other agencies involved in managing the operation of HOV lanes include:

- Public transportation agencies.
- Law enforcement agencies.
- MPOs.
- Local jurisdictions.
- Rideshare organizations.
- Federal agencies.

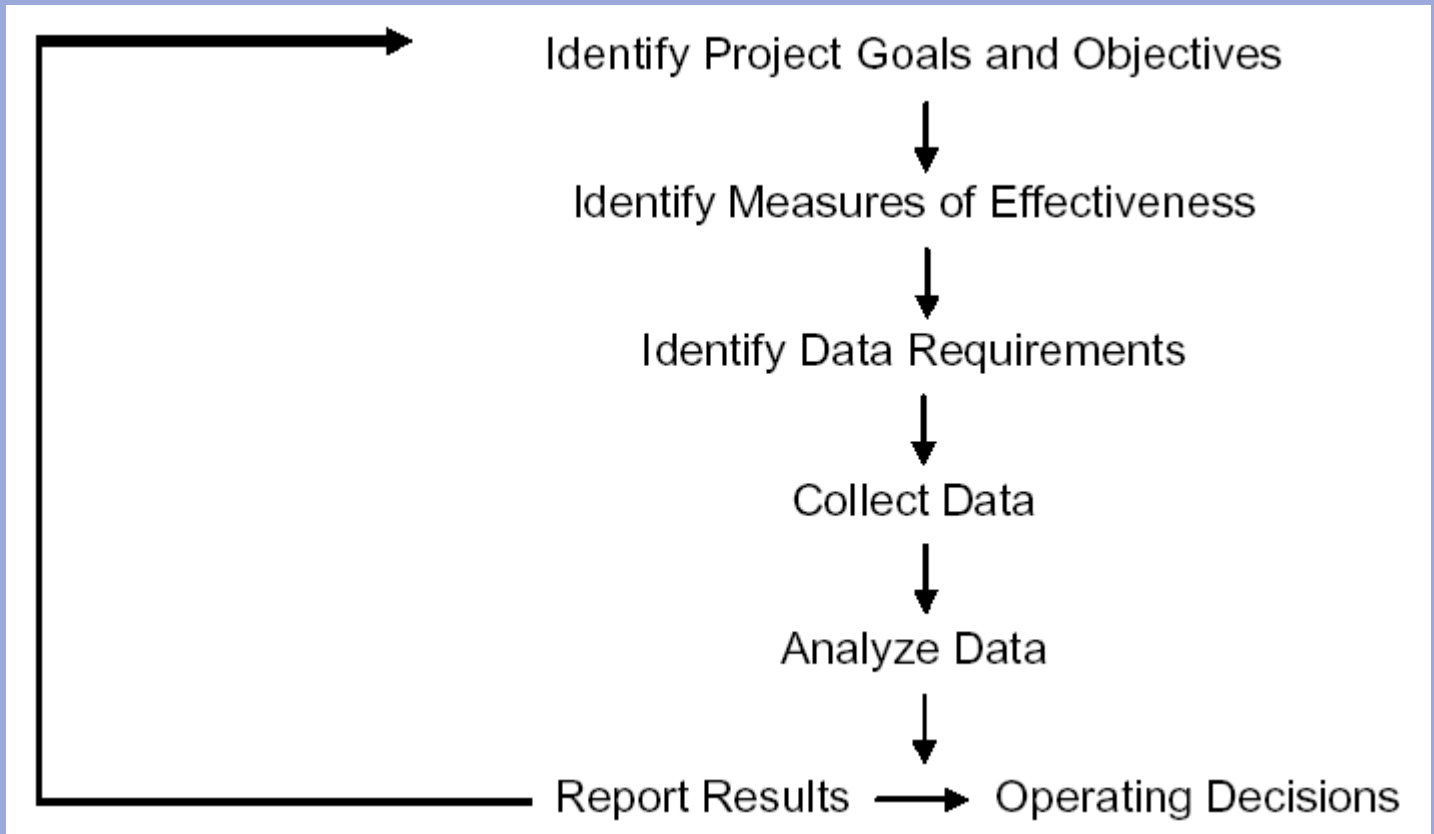
Managing HOV Facilities—
Performance Monitoring

Performance monitoring programs provide accurate information about:

- HOV lane performance.
- General-purpose freeway lane performance.
- Supporting services and facilities.

Managing HOV Facilities—
Performance Monitoring

Steps in developing and conducting an HOV performance monitoring program:



Managing HOV Facilities—
Performance Monitoring

Minimum/maximum HOV lane operating thresholds may be established to help determine if changes in HOV-lane operation are needed.

Managing HOV Facilities—Operation and Enforcement

Elements of a typical operation and enforcement plan:

- HOV operational alternatives.
- Ingress and egress.
- Vehicle-eligibility and vehicle-occupancy requirements.
- Transit facilities and services.
- Hours of operation.
- Enforcement.
- Public information and voluntary enforcement.
- Incident management.

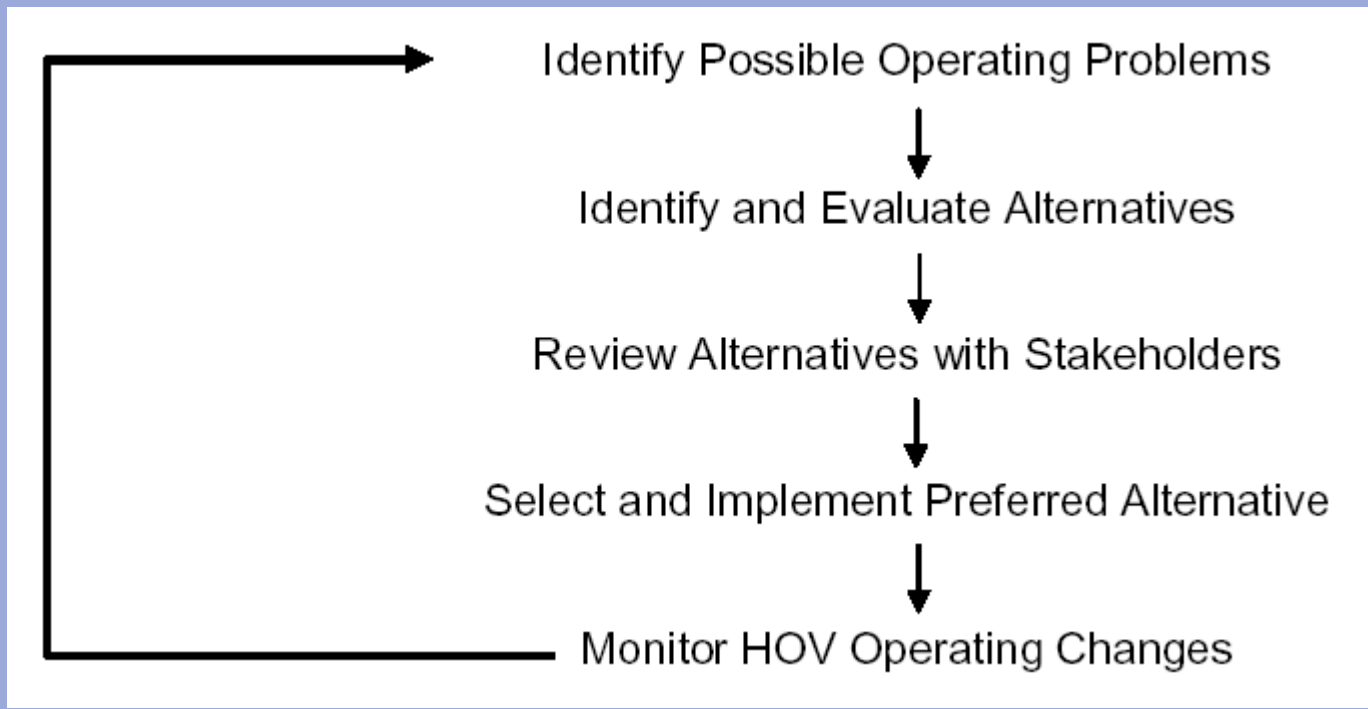
Managing HOV Facilities—Possible Issues

Possible issues with managing HOV facilities:

- Demand exceeding capacity at a 2+ vehicle-occupancy requirement.
- Too few vehicles at a 3+ vehicle-occupancy requirement.
- Exempt vehicle demand exceeding capacity.
- Bottleneck caused before start or end of HOV period.
- Use of lanes by unauthorized vehicles.
- Special event needs.
- Adjustments needed to operating hours.
- Access controls.

Managing HOV Facilities—Assessing Possible Changes

Process for assessing, implementing, and monitoring changes in HOV operations:



Vehicle-Eligibility Requirements

Buses, vanpools, and carpools that meet occupancy requirements are permitted in the HOV lane. Advantages and limitations exist with each type of vehicle.

Vehicle-Eligibility Requirements

Buses:

- Advantages:
  - Highest person-moving capacity.
  - Greatest potential for increasing corridor throughput.
- Limitations:
  - May be difficult to establish/expand bus service.
  - Lane will look unused unless there are high numbers of buses.

Vehicle-Eligibility Requirements

Vanpools:

- Advantage:
  - Highest person-moving capacity.
- Limitation:
  - Lane will look unused unless there are high numbers of vanpools.

Vehicle-Eligibility Requirements

Carpools:

- Advantages:
  - Add users at no public cost.
  - Help avoid having lane look empty.
  - Expand potential user groups.
- Limitations:
  - Too many carpools may congest HOV lane.
  - Safety concerns may arise with some facilities.
  - Potential equity issue when HOV requirement exceeds capacity of small cars.

Vehicle-Eligibility Requirements

To maximize the use of HOV facilities and to meet other goals, some operating agencies have permitted exempt vehicles to use the facility without meeting the required occupancy.

Vehicle-Eligibility Requirements

Designated public transportation vehicles with only driver:

- Advantage:
  - Enhance bus operation efficiencies.
- Limitation:
  - Potential public perception problems if only operator is onboard.

Vehicle-Eligibility Requirements

Marked law enforcement and emergency vehicles:

- Advantage:
  - Travel-time savings and enhanced reliability for emergency vehicles.
- Limitations:
  - Potential public perception problems if only operator is onboard.
  - May lead to abuse by off-duty personnel commuting in personal vehicle.

Vehicle-Eligibility Requirements

Motorcycles:

- Advantages:
  - Add vehicles to lane.
  - Maximize available capacity.
- Limitations:
  - Potential safety concerns.
  - Potential public perception problems.

Vehicle-Eligibility Requirements

Allocation process vehicles:

- Advantages:
  - Maximize available capacity.
  - Manage demand.
  - Expand eligible user group.
  - Address actual or perceived low use.
- Limitations:
  - Enforcement may be more difficult.
  - Time and cost to administer program.
  - Possible confusion among users.
  - May add too many vehicles and cause congestion.

Vehicle-Eligibility Requirements

Value pricing and tolled vehicles:

- Advantages:
  - Maximize available capacity and manage demand.
  - Expand eligible user group.
  - Address actual or perceived low use.
  - Generate new revenues.
- Limitations:
  - Enforcement may be more difficult.
  - Time and cost to administer program/equipment.
  - Possible confusion among users.
  - May add too many vehicles and cause congestion.
  - Equity, double taxation, and revenue issues.

Vehicle-Eligibility Requirements

Low-emission and energy-efficient vehicles:

- Advantages:
  - May encourage use of low-emission and energy-efficient vehicles.
  - Maximize available capacity.
- Limitations:
  - Potential public perception problems.
  - Enforcement may be more difficult.
  - May add too many vehicles and cause congestion.
  - May cause confusion among the public about which vehicles qualify.

Vehicle-Eligibility Requirements

Bicycles:

- Advantage:
  - Provide connections on arterial HOV lanes.
- Limitations:
  - Safety concerns.
  - Not allowed on Interstate systems.

Vehicle-Eligibility Requirements

Commercial vehicles or semi-trucks are not allowed to use any HOV facility in North America because of safety reasons and because allowing trucks would not encourage ridesharing or reduce vehicle miles traveled (VMT).

Vehicle-Eligibility Requirements—Possible Changes

Possible changes in vehicle-eligibility requirements:

- Allowing vanpools and carpools to use a bus-only freeway HOV lane.
- Adding carpools to an HOV lane open to buses and vanpools.
- Allowing lower or single-occupant vehicles to use an HOV lane for a fee.
- Permitting low-emission or energy-efficient vehicles to use an HOV lane.

Vehicle-Eligibility Requirements—Factors to Consider

Factors to consider when assessing possible changes in vehicle-eligibility requirements:

- Project goals and objectives.
- Type and length of HOV lane.
- Design treatments or operating limitations.
- Congestion levels in the HOV and general-purpose freeway lanes.

Vehicle-Eligibility Requirements—Factors to Consider

Factors to consider when assessing possible changes in vehicle-eligibility requirements (cont'd):

- Bus operations.
- System connectivity.
- Supporting facilities and services.
- Safety.
- Enforcement.

Vehicle-Eligibility Requirements—Factors to Consider

Factors to consider when assessing possible changes in vehicle-eligibility requirements (cont'd):

- Perceptions of HOV lane users.
- Perceptions of non-users.
- Perceptions of policy makers.

Vehicle-Eligibility Requirements—Factors to Consider

Factors to consider when assessing possible changes in vehicle-eligibility requirements (cont'd):

- Target markets.
- Pricing alternatives.
- Cost of tolling infrastructure and strategies.
- Level and use of revenues.

Vehicle-Eligibility Requirements—Factors to Consider

Factors to consider when assessing possible changes in vehicle-eligibility requirements (cont'd):

- Impact on current users.
- Identifying eligible vehicles.
- Potential equity concerns.
- Methods to restrict use.

Vehicle-Occupancy Requirements

FHWA: 3+ passengers/vehicle

SAFETEA-LU: 2+ passengers/vehicle

Vehicle-Occupancy Requirements

Examples of vehicle-occupancy requirements:

- 2+ persons per vehicle.
- 3+ persons per vehicle.
- 4+ persons per vehicle.
- Variable vehicle-occupancy requirements by time of day.

Each vehicle-occupancy requirement has advantages and limitations.

Vehicle-Occupancy Requirements

2+ persons:

- Advantages:
  - Easiest to form.
  - Often significant numbers of existing 2+ carpools in a corridor.
- Limitations:
  - Too many 2+ carpools in a corridor cause congestion.
  - May not reduce vehicle trips if many 2+ carpools already exist.

Vehicle-Occupancy Requirements

3+ persons:

- Advantages:
  - Solves congestion problems at 2+ level.
  - Higher person-moving capacity.
- Limitations:
  - Difficult to form 3+ carpools.
  - Existing 2+ carpools that cannot find an additional passenger will add to congestion of general-purpose lanes.

Vehicle-Occupancy Requirements

4+ persons:

- Advantages:
  - Solves congestion problems at 3+ level.
  - Higher person-moving capacity.
- Limitations:
  - Difficult to form 4+ carpools. Too few 4+ carpools may make lane look unused.
  - Existing 2+ and 3+ carpools that cannot find an additional passenger will add to congestion of general-purpose lanes.

Vehicle-Occupancy Requirements

Variable requirements by time of day (3+ during peak-hours; 2+ during off-peak hours):

- Advantages:
  - Reduce peak-period congestion.
  - More acceptable to public than 3+ at all times.
- Limitations:
  - May be confusing for users.
  - May make enforcement more difficult.

Vehicle-Occupancy Requirements—Possible Changes

Possible changes in vehicle-occupancy requirements:

- Increasing vehicle-occupancy levels from 2+ to 3+.
- Decreasing vehicle-occupancy levels from 3+ to 2+.
- Implementing variable time-of-day occupancy requirements (3+ during peak-hours; 2+ during off-peak hours).

Vehicle-Occupancy Requirements—Factors to Consider

Factors when assessing possible changes in vehicle-occupancy requirements:

- Project goals and objectives.
- Congestion levels in HOV and general-purpose freeway lanes.
- System connectivity.
- Enforcement.

Vehicle-Occupancy Requirements—Factors to Consider

Factors to consider when assessing possible changes in vehicle-occupancy requirements (cont'd):

- Current number of two-person and 3+ carpools.
- Bus operations.
- Perceptions of HOV-lane users.
- Perceptions of general-purpose freeway lane users.

HOV Operating Hours

Operating-hour scenarios for HOV facilities:

- 24/7.
- Extended hours.
- Peak-period-only operation.
- Special events.

HOV Operating Hours

24/7:

- HOV lane is in operation at all times.
- Most often found on busways, exclusive two-directional HOV lanes, and concurrent flow HOV lanes.

HOV Operating Hours

24/7 (cont'd):

- Benefits:
  - Around-the-clock travel-time savings and trip-time reliability.
  - HOV-lane use for recreational trips.
  - Eliminates motorist confusion, eases enforcement, simplifies signing and lane markings.
- Limitations:
  - Negative public perception if facility is not well-used during off-peak hours.
  - Need for ongoing enforcement.
  - Potential safety concerns.

HOV Operating Hours

Extended hours:

- Typically from 6 a.m. to 11 a.m. and 3 p.m. to 7 p.m.
- Often found on exclusive-reversible HOV lanes.
- Advantage:
  - Travel-time savings and time reliability when general-purpose freeway lanes are most congested.
- Limitation:
  - Potential motorist confusion, making enforcement more difficult and additional signing and pavement markings necessary.

HOV Operating Hours

Peak-period-only operation:

- Typically from 6 a.m. to 9 a.m. and 4 p.m. to 6 p.m.
- May be in the peak direction of travel only or only the morning peak period, peak direction.
- Most often found on concurrent flow and contraflow HOV lanes.

HOV Operating Hours

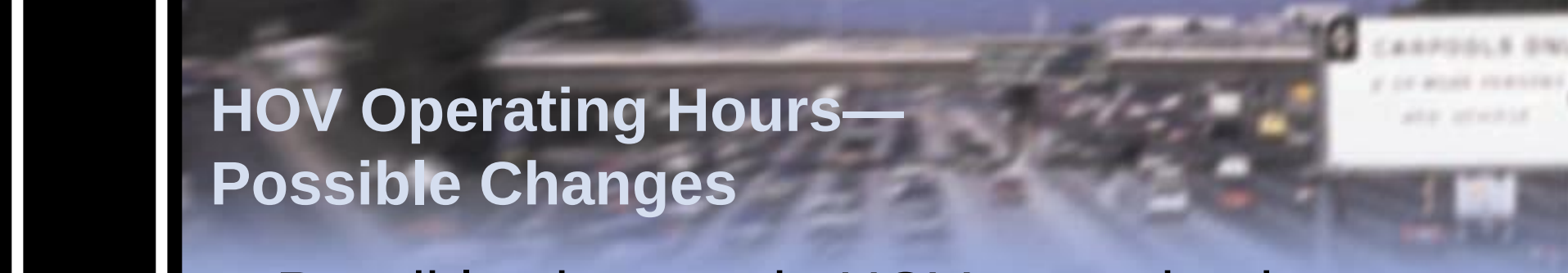
Peak-period-only operations (cont'd):

- Advantages:
  - Priority to HOVs at critical times.
  - Solves specific bottleneck problems.
- Limitation:
  - Potential motorist confusion, making enforcement more difficult and additional signing and pavement markings necessary.

HOV Operating Hours

Special events:

- HOV lane remains open for extra hours to assist with traffic management during a special event.
- Often found on exclusive-reversible HOV lanes.



HOV Operating Hours—Possible Changes

Possible changes in HOV operating hours:

- Lengthening peak-period operations.
- Changing peak-period or extended HOV operations to 24/7 operation.
- Reducing peak-period or extended operation.
- Reducing 24/7 operation to peak-period or extended operating hours.
- Opening 24/7 HOV lanes to general-purpose traffic on evenings and weekends.

HOV Operating Hours—Factors to Consider

Consider the following factors when assessing possible changes in HOV operating hours:

- Project goals and objectives.
- Congestion levels in the HOV and general-purpose freeway lanes.
- Type of HOV lane.
- Use of lane during other time periods.
- Bus operations.

HOV Operating Hours—Factors to Consider

Consider the following factors when assessing possible changes in HOV operating hours (cont'd):

- System connectivity.
- Enforcement.
- Safety.
- Changes in signing.
- Operating costs.

HOV Operating Hours—Factors to Consider

Consider the following factors when assessing possible changes in HOV operating hours (cont'd):

- Benefits/benefit-cost ratio.
- Perceptions of HOV-lane users.
- Perceptions of general-purpose freeway lane users.
- Perceptions of policy makers.

Conclusion:

For more information and specific case studies related to HOV facilities, please view the *HOV Lane Eligibility Requirements and Operating Hours Handbook*.

The handbook, support documents, and associated outreach materials are available on the HOV Pooled-Fund Study Web site: http://hovpfs.ops.fhwa.dot.gov.